

### REMARKS

Claims 2-4, 13-15, 18-19, 29-31 and 34-47 are canceled. Applicants reserve the right to pursue the canceled subject matter in one or more continuing applications.

Claims 1, 5, 7, 10-12, 20, 25-27 and 32 have been amended and claims 48-58 are new. The amendments and new claims are supported throughout the application as filed, e.g. at p.1, line 28 to p.2, line 10; Examples 1-10; and the original claims. No new matter has been added.

Upon entry of this amendment claims 1, 5-12, 16, 17, 20-28, 32, 33 and 48-58 will be pending and under examination.

#### **Claim Rejections under 35 U.S.C. § 112, first paragraph, Written Description**

The examiner rejected claims 1-2, 5-13, 16-29 and 32-34 for not complying with the written description requirement of 35 U.S.C. § 112, first paragraph. Specifically, examiner states: "the specification only provides guidance for a single microbial amylopullulanase gene from a single bacterial species, and a single fragment thereof." (Office Action p.2)

Claims 2, 13, 18, 19 and 29 are canceled. Claims 1, 12, 27 and 32 have been amended to recite a specifically defined fragment of *Thermoanaerobacterium ethanolicus* amylopullulanase, which is acknowledged by the Examiner to be adequately described. Therefore, as amended claims 1, 12, 27 and 32 comply with the written description requirement of 35 U.S.C. § 112. Therefore, applicants respectfully request that this rejection be withdrawn.

#### **Claim Rejections under 35 U.S.C. § 112, first paragraph, Enablement**

The examiner rejected claims 1-2, 5-13, 16-29 and 32-34 as not being enabled. Specifically, the Examiner states:

while being enabling for claims limited to a nucleotide sequence from *Thermoanaerobacter ethanolicus* which encodes [amylo]pullulanase, or a particular truncation thereof which does not encode amino acids 1-105 or 1061-1481 of the enzyme, and plants transformed therewith; [the application] does not reasonably provide enablement for claims broadly drawn to any nucleotide sequence from any source...which encodes any amylopullulanase of any sequence or any fragment thereof, or their use..." (Office Action p. 4)

Claims 2, 13, 18, 19 and 29 are canceled. Claims 1, 12, 27 and 32 have been amended to recite a specifically defined *Thermoanaerobacterium ethanolicus* amylopullulanase fragment that

includes amino acids 106-1060 of SEQ ID NO:1 and is free of amino acids 1-105 and 106-1481 of SEQ ID NO:1. The scope of the pending claims corresponds to the Examiner's acknowledged scope of enablement. Therefore, applicants respectfully request that this rejection be withdrawn.

**Claim Rejections under 35 U.S.C. § 112, second paragraph, Definiteness**

Claims 3-4, 14-15, 30-31, and 35-36 were rejected for indefinitely reciting "T." as an abbreviation for *Thermoanaerobacterium*. These claims have been cancelled, and their subject matter has been incorporated into remaining claims as amended herein. Amended claims recite (or depend on claims reciting) "*Thermoanaerobacterium ethanolicus*", thereby obviating the Examiner's rejection. Therefore, applicants respectfully request that this rejection be withdrawn.

**Claim Rejections under 35 U.S.C. § 102(a), Anticipation**

The examiner rejected claims 1-36 as being anticipated by EP 1,164,194 (ACADEMIA SINICA). Claims 2-4, 13-15, 18, 19, 29-31 and 34-36 are canceled. Claims 1, 12, 27 and 32 have been amended. to recite a specifically defined *Thermoanaerobacterium ethanolicus* amylopullulanase fragment. The rejection is respectfully traversed insofar as it may be applied to the pending claims.

The present claims recite (or depend on claims that recite) a fragment of *Thermoanaerobacterium ethanolicus* amylopullulanase that includes amino acids 106-1060 of SEQ ID NO:1 and is free of amino acids 1-105 and 106-1481 of SEQ ID NO: 1. ACADEMIA SINICA, on the other hand, teaches an APU fragment that includes amino acids 75 to 1029. The ACADEMIA SINICA construct clearly does not include amino acids 1030 to 1060, which are required by the claims as presently amended. For this reason, ACADEMIA SINICA do not anticipate the claims of the presently amended application, and applicants respectfully request that this rejection be withdrawn.

**Claim Rejections under 35 U.S.C. § 103(a), Obviousness**

Claims 1-2, 5, 7-9, 11-13, 16, 20, 22-25, 27, 29, 32 and 34 were rejected as being obvious and unpatentable over Barry et al. (U.S. 5,750,876) taken with Duffner (U.S. 6,043,074). The Examiner extended the same obviousness analysis, taking further view of Maruta (U.S. 5,516,668),

to claims 17-18, 28 and 33. Additionally, Barry et al. and Duffner were combined with Leisy et al. to reject claims 6 and 21.

Claims 2, 13, 18, 29 and 34 are canceled. The pending claims have been amended (or depend on claims so amended) to recite DNA constructs encoding a specifically defined fragment of the *T. ethanolicus* APU. Neither Duffner, Barry et al., Maruta or Leisy et al. teach the particular fragment of the present claims, i.e. a fragment including at least amino acids 106-1060 of SEQ ID NO:1. Although Duffner teaches a microbial APU gene and suggests plant transformations with the gene, Duffner does not teach the use of the specific construct claimed in the present amended application. The combination of Duffner with any (or all) of the other references fails to provide any motivation for one of ordinary skill in the art to arrive at the specific construct, or methods for using the specific construct, as presently claimed. Therefore, applicants respectfully request that this rejection be withdrawn.

Claims 1-2, 5, 7-10, 12-13, 16-18, 20, 22-24, and 26 were rejected as being obvious and unpatentable over Rodriguez (U.S. 5,888,789) taken with Duffner. Claims 2 and 13 are canceled. Examiner's analysis no longer applies to the pending claims in their amended form for the same reason as that given above. Rodriguez does not teach the use of an APU encoding gene at all, and combining Rodriguez and Duffner does not provide a specific motivation for making or using the specific constructs as claimed in the present application.

Claims 1-5, 7-9, 11-20, 22-25 and 27-36 were rejected as being obvious and unpatentable over Barry et al. taken with Maruta, Mathulpa et al., Zeikus et al. and Chiang et al. (July 2001). Claims 2-4, 13-15, 18, 19, 29-31, and 34-36 are canceled. The examiner cites the combination of Zeikus et al. and Chiang et al. as providing the motivation to use a truncated *T. ethanolicus* APU, in a construct taught by Barry et al., and transforming plants as taught by Maruta et al. and suggested by Barry et al. However, the Examiner's rejection does not point to any motivation for making the specific constructs claimed in the presently amended application, nor for using these specific constructs as presently claimed.

The Examiner cites Figure 7, on page 259 of Zeikus et al., as teaching a truncated *T. ethanolicus* APU. However, the functional truncated APU taught by Zeikus et al. consists of amino acids 107 to 1224. The present claims recite a fragment including at least amino acids 106 to 1060. Zeikus et al. does not provide the guidance needed to arrive at the presently claimed subject matter. In fact, Figure 7 in Zeikus et al. teaches away from the presently claimed subject matter. Figure 7

reports a *T. ethanolicus* APU truncation consisting of amino acids 107 to 1102 that suffers a severe reduction of its catalytic half-life. The Zeikus 107 to 1102 fragment had a ~95% reduction in half-life compared to the full length enzyme. Given Zeikus' results, it would have been wholly unpredictable that a smaller fragment, such as a fragment encompassed by the fragment recited in the claims, would retain any activity whatsoever. It would have been even more surprising that this smaller fragment would be several-fold more active when expressed in plant seeds instead of *E. coli.*, as Applicants have shown (see Example 10 of the specification). Thus, neither Zeikus nor any other of the cited references provide any reason for one of ordinary skill to have made the claimed constructs and cells.

Other art cited by the Examiner also teaches away from the presently claimed subject matter. The Examiner cites Ramesh et al. for the proposition that "deletions of amino acid residues greatly reduces the thermal stability of the enzyme." (Office Action p.5) Ramesh reports that "we have deleted the N-terminus region from the *T. ethanolicus* amylopullulanase and have lost thermal stability at 85°C..." (p.100, column 2, top paragraph). Thus, if anything, Ramesh provides a disincentive for a skilled artisan to make deletions or fragments of the enzyme, much less the specifically claimed fragments.

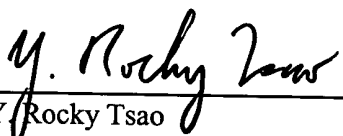
In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of the rejection.

Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: \_\_\_\_\_

10-3-03

  
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